



Armed Forces College of Medicine AFCM



Spinal Cord Transection

Dr. Mohamed Fekry

Lecturer of Medical Physiology

AFCM

INTENDED LEARNING OBJECTIVES (ILOs)



By the end of this lecture the student will be able to:

- 1.Explain effects of complete transection of the spinal cord at different levels.
- 2.Explain stages of complete transection of the spinal cord
.
- 3.Explain the effects in hemisection of the spinal cord

Complete Transection of Spinal Cord



Its effects are according to the site of l

A) At upper cervical level → Immediate d

B) At lower cervical level →

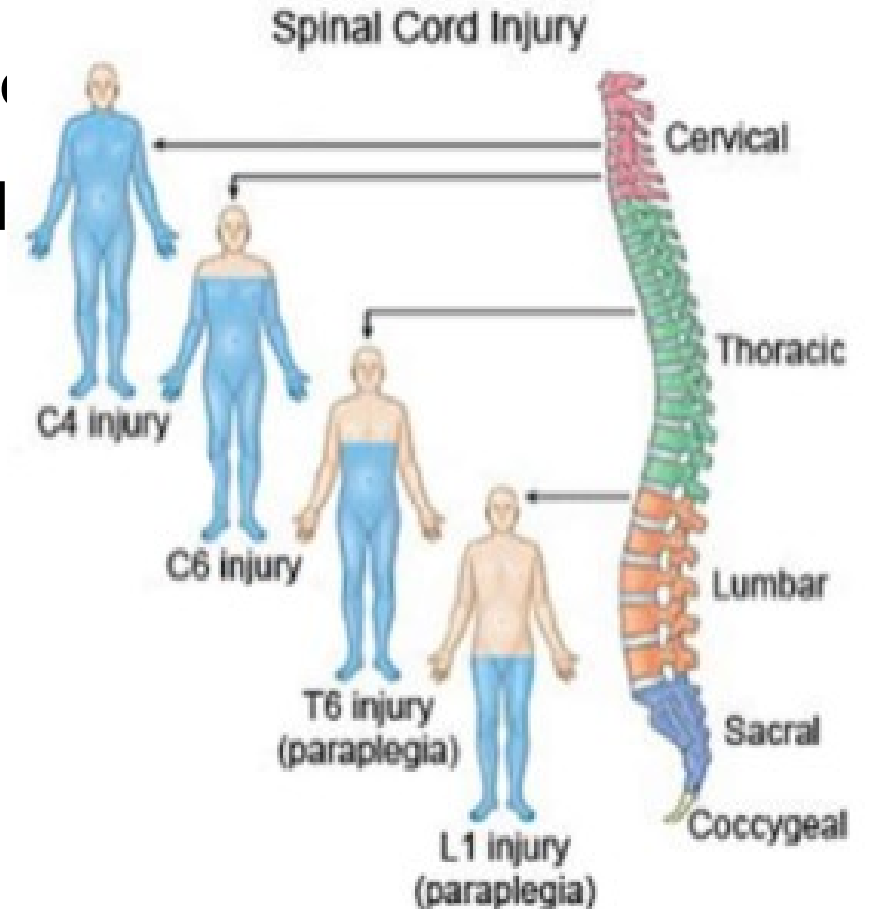
1. **Quadriplegia** (paralysis of 4 limbs)

2. **Diaphragmatic respiration.**

C) At mid-thoracic region →

1. **Paraplegia** (paralysis of lower limbs).

2. **Normal respiration.**



Complete Transection of Spinal Cord



3 Stages following complete transection of spinal cord

**1- Acute Stage
(stage of
spinal shock)**

**2- Stage of
Recovery of
Reflex
Activity**

**3- Third
stage:**
-Under good care.
-Under bad care.

Complete Transection of Spinal Cord



I) Acute Stage (stage of spinal shock):

It's caused by sudden withdrawal of the supraspinal facilitatory effect on **spinal motor neurons**.

It lasts **2-6 weeks** and characterized by:

1. Sensory: complete sensory loss at & below the level of lesion.

2. Motor: Flaccid paralysis (decreased M.T.) **at** the level due to **LMNL**, &

below the level due to acute **UMNL**.

3. Vasomotor tone: lost → causes decreased A.B.P.

4. Micturition and Defecation: Retention with overflow.

Complete Transection of Spinal Cord



II) Stage of Recovery of Reflex Activity:

It's due to denervation hypersensitivity & increased collaterals from surrounding inputs.

Voluntary movement and sensations **never** recover.

It is characterized by:

1. **Recovery of muscle tone** (more in **flexors**) → paraplegia in flexion.
2. **Recovery of deep reflexes:** as knee jerk.
3. **Appearance of flexor withdrawal reflex.**
4. **Automatic Bladder.**
5. **Mass Reflex:** mass response due to hyperexcitability, scratch below level of lesion → sweating, micturition, defecation, and flexion of lower limbs.
6. **Coitus Reflex:** Scratching of upper medial part of thigh → erection &

Complete Transection of Spinal Cord



III- Third Stage : It is either:

- A) Under good care by:**
1. Changing position of patient from time to time.
 2. Application of antibiotic spray on any inflamed area.
 3. Frequent evacuation of rectum and urinary bladder.

Patient will continue in the II stage but:

- a. Paraplegia in **extension** (M.T. more in extensors).
- b. **Disappearance** of mass reflex and coitus reflex.
- c. **Appearance** of crossed extensor reflex and positive supporting reflex.
- d. **Clonus.**

B) Under Bad Care:

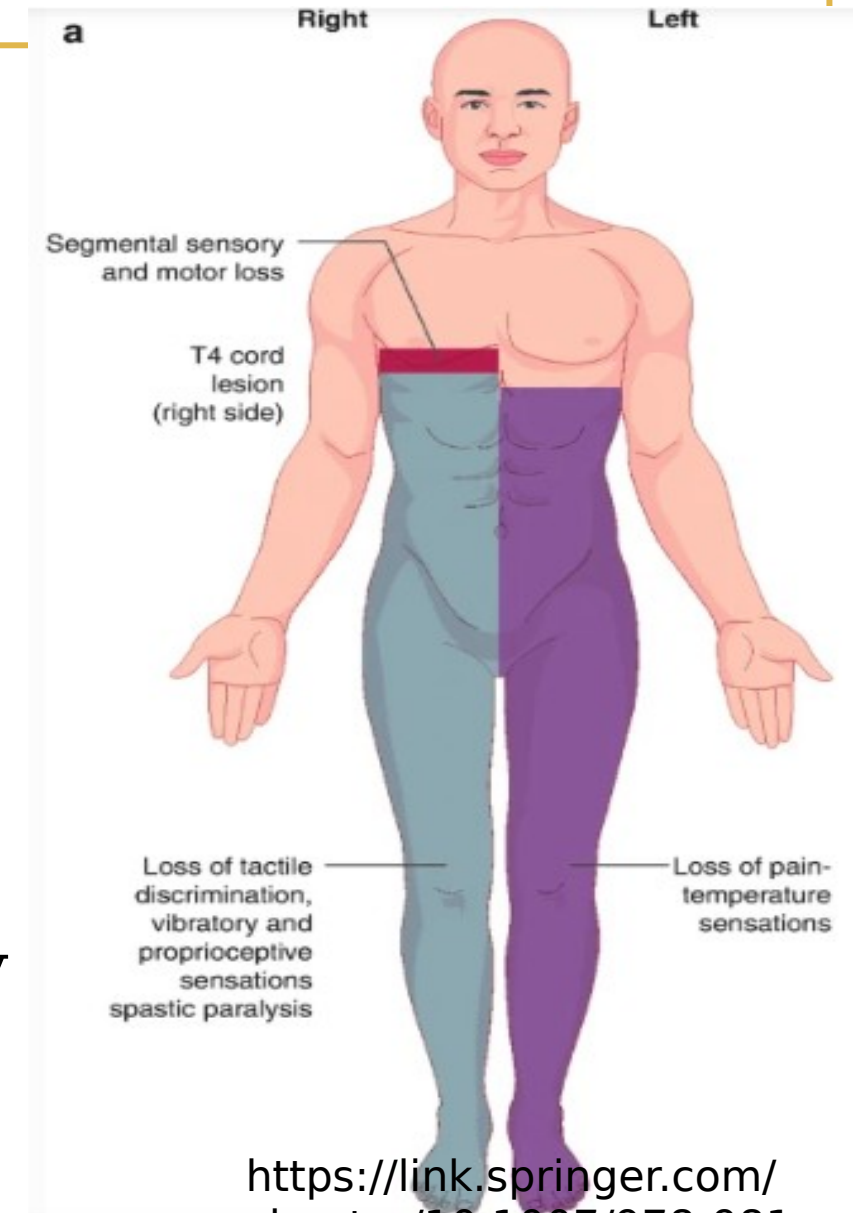
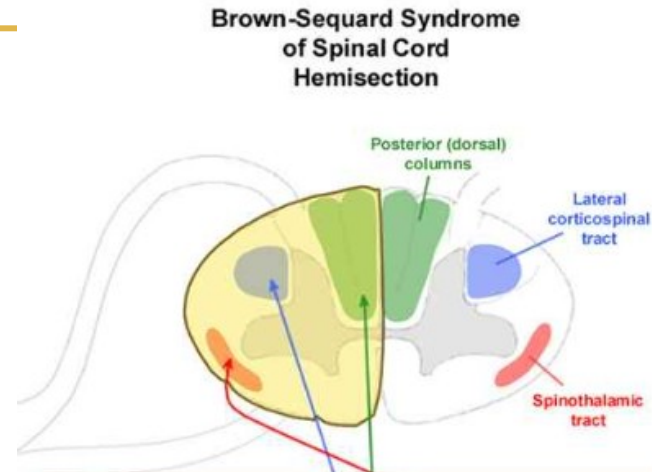
Hemisection of Spinal cord (Brown-Sequard Syndrome)



Effects:

I) At the level:

- Sensory:** Loss of **all sensations** in the areas supplied by nerves that enter the damaged segment.
- Motor:** LMNL of the muscles supplied by the damaged segment.



<https://link.springer.com/chapter/10.1007/978-981->

Hemisection of Spinal cord (Brown-Sequard Syndrome)



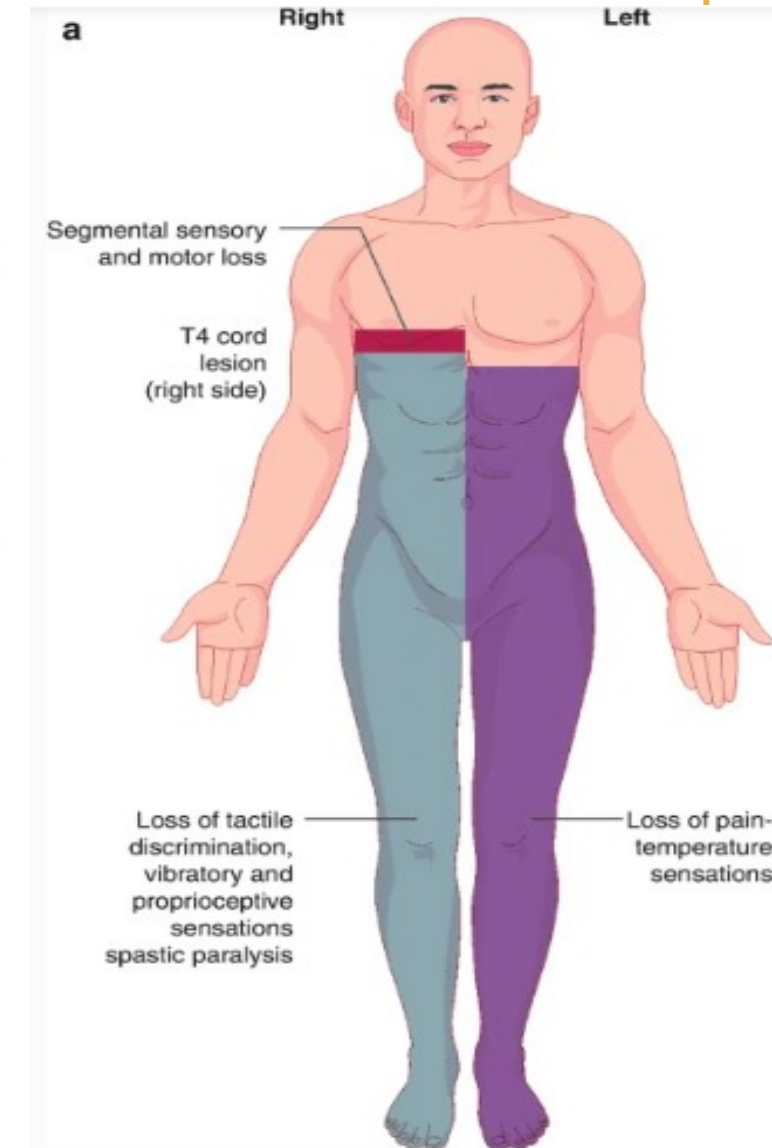
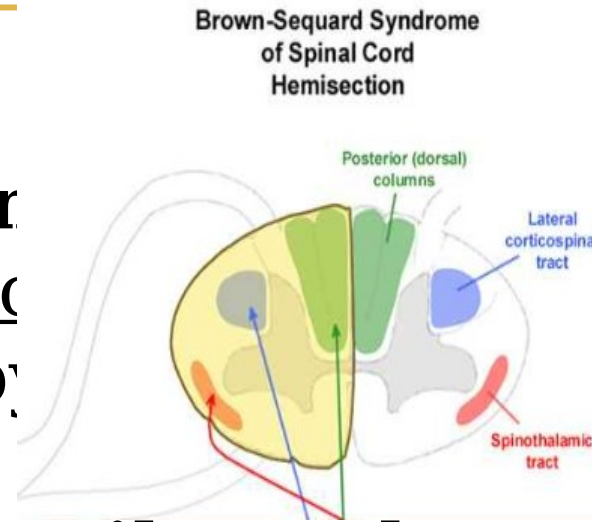
II) Below the level:

- **Sensory:** **Spinothalamic** sensory loss in **contralateral** side except Touch (partially transmitted by dorsal column)

Dorsal column loss on the **ipsilateral** side.

- **Motor** → **UMNL** ipsilateral side.

- **Vasomotor tone** → Vasodilation **ipsilateral** side.



III) Above the level:

Zone of **hyperesthesia** ,i.e. increased



- 1. Right hemi-section of the spinal cord at mid-thoracic level, results in which of the following?**
- A. UMNL paralysis in the Rt. leg.
 - B. UMNL paralysis at the level of the lesion.
 - C. Loss of pain and temperature sensations in the Rt. leg.
 - D. Loss of sense of position in the Lt. leg.
 - E. UMNL paralysis in the Lt. leg



2. At the stage of spinal shock which of the following occurs?

- A. Flexor withdrawal reflex returns.
- B. Tone appears in extensor muscles before flexors.
- C. Tendon jerks exaggerated.
- D. Micturition becomes retention with overflow.
- E. Recovery of vasomotor tone

Summary



- Effects of complete transection of the spinal cord are according to the site of lesion.**
- Stages of complete TS of the spinal cord include acute & recovery stages.**
- There effects below, above & at the level of the lesion.**

SUGGESTED TEXTBOOKS



1. Guyton and Hall textbook of medical physiology, thirteenth edition 2016, Elsevier, chapter 55, from page 695 to 706.

Thank You